10. CONCLUSIONS

The City of Bloomington Utilities is about to embark on a major capital improvements program to ensure that their customers continue to receive high quality drinking water at sufficient quantities to keep pace with anticipated growth. Based on population and water demand projections, the maximum day demands for Year 2010 are expected to be 24 mgd. Therefore, CBU is expected to have insufficient treatment capacity by Year 2010.

A. PROPOSED ALTERNATIVES

For the purpose of this study, the Year 2030 was determined to be the design year for determining the required capacity of the proposed facilities. The maximum day demands for 2030 are projected to be approximately 32 mgd. Therefore, the alternatives evaluated will increase CBU's water treatment and distribution capacity from 24 mgd to 36 mgd to ensure sufficient capacity is provided through 2030. Several alternatives were evaluated to meet the anticipated water requirements. The alternatives evaluated include expanding the capacity of the Monroe WTP (Alternative A); constructing a new Dillman WTP to the southwest of Bloomington using Lake Monroe as the water source (Alternative B); and constructing a new North WTP using either a groundwater or surface water supply (Alternative C).

The financial evaluation indicates that expanding the capacity of the Monroe WTP is the most economical of the alternatives evaluated. This alternative includes expanding the capacity of the Monroe WTP using membrane filtration; constructing new parallel raw and finished water mains to convey the additional flow; and constructing the Southeast Water System Improvements which will convey the additional treated water from the South service level to the Central service level. The new and existing finished water transmission mains and the firm pumping capacity between the South service level and Central service level would support up to 42 mgd of flow. It may be feasible that the Monroe WTP could ultimately be expanded to 42 mgd in the future. The disadvantages to this option is that the treatment facilities and site would not easily support further

expansion, and would not provide the same level of redundancy as compared to a new separate treatment facility.

The North WTP alternative using Lake Lemon, Bean Blossom Creek and Griffy Lake as a water supply (Option 2 to Alternative C) is only slightly more expensive than expanding the Monroe WTP. The proposed North WTP would have a capacity of 12 mgd and could be used as a peaking plant, supplementing the Monroe WTP to meet maximum day demands. Based on past yield studies, the North surface water sources should have a firm annual yield of approximately 6 mgd. However, this plant could provide up to 12 mgd of treatment capacity as long as the annual average plant capacity remained at approximately 6 mgd. This alternative provides several benefits, including the security of having two water sources and good hydraulics associated with providing water to customers from the North. It should be noted that this water source may not have sufficient yield to support expansion of the proposed WTP beyond 12 mgd in the future without other sources to supplement the North supply. Other sources may include blending groundwater with the North surface water supplies or possibly conveying raw water from another surface water source to the North plant as a supplement. If this alternative is selected, a study should be performed to verify the yield and water quality of the water sources and the proposed treatment processes.

Both the proposed Dillman WTP using Lake Monroe as the water supply (Alternative B) and the North WTP using a groundwater supply (Alternative C and Option 1 to Alternative C) have several non-economic advantages over the other alternatives. These include the security and reliability of two separate plants and their ability to be easily expanded from 12 mgd to 24 mgd in the future. The existing Monroe WTP also could be expanded, if additional capacity is needed in the future.

10. CONCLUSIONS

B. TREATMENT PROCESSES

CBU has expressed a strong interest in using membranes to comply with future turbidity requirements, possible *Cryptosporidium* removal requirements, and to provide high quality water to its customers. Membranes provide a positive barrier to *Cryptosporidium* and are a strong candidate for use, especially at a new water treatment plant. Since the Monroe WTP is presently in compliance with finished water turbidity requirements, CBU should consider evaluating Ultraviolet (UV) irradiation for *Cryptosporidium* inactivation before making a final decision to implement membranes at the Monroe WTP. UV testing on a pilot-scale would be required before any decision could be made on a full-scale implementation. It is likely that expansion in the capacity of the Monroe WTP using conventional gravity media filters and implementing UV for *Cryptosporidium* inactivation would be more economical than membrane filtration.

If the groundwater supply alternative is selected and the water source is determined to be "under the influence" of surface water, it is recommended that MF/UF membranes be implemented. If the water source is determined to be "strictly" groundwater, then conventional gravity media filtration would be appropriate. The water source determination is made by the Indiana Department of Environmental Management.

C. IMPROVEMENTS SCHEDULE

As the projected water demands for the Year 2010 is expected to exceed the capacity of the existing Monroe WTP, it is recommended that the proposed water system improvements be completed and operational in the Year 2008. This will necessitate starting construction by January 2006. CBU should complete any final pilot studies and/or investigations by Spring 2004 and begin design by late Spring or early Summer 2004 to ensure sufficient time is allowed to complete the design phase; obtain all permits and approvals; acquire all necessary land and easements; accept bids; and award the construction contract by January 2006.

10. CONCLUSIONS

As this capital improvements program represents an important and critical decision on the direction of the water utility, it is paramount to include the public in the selection of the alternatives described herein. The schedule allows several months for obtaining input and comments through public meetings prior to making a decision and proceeding with the capital improvements program.

It is recommended that CBU make a final decision regarding the proposed water system improvements in the Year 2003. This should allow adequate time to complete all phases of the project and have the new facilities operational by mid-Year 2008.